Space Weather Forecast

Issued on Saturday 9 November 2024 at 01:29 Local

This forecast provides a four-day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Moderate solar activity with a slight chance of Strong flares.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity has been Moderate, with a single low-level Moderate-class flare observed from a region in the southwest disc.

There are currently eight sunspot regions on the visible disc. The three most actively flaring regions all lie in the southern hemisphere. Of these, the two larger regions near centre-disc declined in size and reduced in complexity during the period. The moderately-large sunspot group in the far southeast rotated into clearer view, with a cluster of mature spots and a complex magnetic configuration, though was rather inactive. A large, single, mature spot in the northwest was also inactive. The other regions are smaller or magnetically simple, and generally either stable or showing only limited change.

No definitive Earth-directed CMEs (Coronal Mass Ejections) were observed, however several minor perturbations were observed on 08 Nov in the vicinity of two sunspots near centre-disc in the southern hemisphere. Although available solar imagery did not indicate any clear Earth-directed CMEs, some faint ejecta cannot be completely be discounted as having some Earth-directed trajectory.

Solar Wind / Geomagnetic Activity: A CME that left the Sun early on 05 Nov gave Earth a glancing impact around 08/0500 UTC. Solar winds were initially at background levels, around 350km/s, but increased to 380-400km/s in the hours following the CME arrival. A decline that followed to around 350km/s was reversed late in the period when winds increased to mainly Slightly Elevated levels, with a peak of 427km/s at 08/2241 UTC. The Interplanetary Magnetic Field (IMF), Bt, was initially Weak, but increased to mainly Moderate levels between 08/1000-08/1130 UTC. The IMF then became Strong between approximately 08/1130-08/1900 UTC, before becoming mainly Moderate from around 08/2015 UTC. The important north-south component was mostly Weakly southward (negative) directed to start the period, then Moderately northward (positive) through the middle of the UTC day on 08 Nov. The north-south component of the IMF rotated to a Moderately southward (negative) direction from around 08/1700 UTC, then varied between Weakly and Moderately southward (negative) to end the period.

Resultant Geomagnetic Activity was Quiet to Active (Kp 0-4).

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Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) was at background levels through the period.

Four-Day Space Weather Forecast Summary

Solar Activity: Moderate activity is forecast to continue, with further Moderate-class flares expected and a slight chance of High activity from isolated Strong flares, with the largest regions in the southern disc considered the most likely sources.

Solar Wind / Geomagnetic Activity: No Earth-bound CMEs currently feature in the forecast period, although some faint ejecta, mainly associated with occasional flare activity near centre-disc over the past couple of days, cannot be completely be discounted as having some Earth-directed trajectory later in the period. However, any potential impacts would be expected to be weak.

Solar winds are currently Slightly Elevated due to ongoing CME influence. A weak coronal hole fast wind enhancement is considered likely to occur on Day 1 (09 Nov), with Slightly Elevated wind speeds forecast at peak before easing on Day 2 (10 Nov). This may be masked by the current enhancement from the CME glance. There is a chance for further possible fast wind influence to bring Slightly Elevated or Elevated speeds later Day 2 or Day 3 (10 or 11 Nov) from a larger, but much more southerly located coronal hole. Speeds should trend back towards background levels during Day 4 (12 Nov).

Generally Quiet to Unsettled activity is forecast but with isolated Active (Kp4) intervals likely and a slight chance of peak G1/Minor Storm conditions, mainly between Days 1-3 (09-11 Nov) due to generally minor CME and HSS influence.

Energetic Particles / Solar Radiation: The count rate of energetic particles (High energy protons) is at background levels. There is a slight chance of S1/Minor Proton Storms or greater on Days 1-2 (09-10 Nov), rising to a chance from Day 3 (11 Nov) as many of the larger regions rotate into more geoeffective positions in the western hemisphere.

Geomagnetic Storms

Geomagnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	**G1 to G2**	No	10	20	10	5
Strong	**G3**	No	1	1	1	1
Severe	**G4**	No	1	1	1	1
Extreme	**G5**	No	1	1	1	1

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Radio Blackouts - X-Ray Flares

X-Ray Flares	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability			(%)	(%)	(%)	(%)
Active	R1-R2 (M Class)	Yes	90	90	90	90
Very Active	R3-R5 (X Class)	No	20	20	20	20

Solar Radiation Storms (High Energy Protons)

Radiation Storms	Level ($cm^{-2}sr^{-1}s^{-1}$)	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability (Exceedance)			(%)	(%)	(%)	(%)
Active	≥ S1	No	20	20	25	25
Very Active	≥ S3 *	No	1	1	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and/or 50 MeV ≥ 10pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

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